In vitro characterization of plant growth promoting and biocontrol activity of beneficial microorganisms

Sai Shiva Krishna Prasad Vurukonda, Davide Giovanardi and Emilio Stefani

via Amendola, department of Life Sciences, University of Modena and Reggio Emilia, Modena, Italy.

Email: Vurukonda.saishivakrishnaprasad@unimore.it

Abstract:

Plant roots are associated with numerous and diverse types of beneficial and pathogenic microorganisms. Among them, plant growth–promoting (rhizo)bacteria (PGPB or PGPR) are isolated from plants crops worldwide, and many of them are used as agricultural inoculants. Agricultural biofertilization and biocontrol of pathogens are eco-friendly alternatives to chemical usage and have less energy, environmental, and economic costs. PGPB isolation and evaluation are essentials steps for determining bacteria that could improve plant development and productivity. In the present study three *Streptomyces* sp. strains SB14, SA51 & SL81, two *Pseudomonas* sp. strains PT65 & PN53, an *Agrobacterium* sp. strain AR39 and an internal control (IC) *Pseudomonas synxantha* were evaluated *in vitro* for different plant growth promoting and biocontrol activities. The results were aimed to identify possible antagonists able to inhibit different plant bacterial (*Xanthomonas vesicatoria*, *Clavibacter michiganensis subsp. michiganensis, Clavibacter michiganensis subsp. sepedonicus*, *Acidovorax citrulli* and *Ralstonia solanacearum)* and fungal (*Rhizoctonia solani, Sclerotium sp., Fusarium oxysporum, Alternaria solani and Monilia* laxa) pathogens. All the strains were screened for biocontrol activity on three different media's and AIA (average inhibition area) was calculated. Among the isolates, each strain showed different ability to inhibit the pathogens: *Streptomyces* sp. strain SA51 was found to

be most active. The most prospective strains SA51, AR39 and DLS65 were further evaluated in the field, as possible biocontrol agents for the tomato spot disease (*X. vesicatoria*), singularly and as a consortium. Results will improve our understanding on the use of such microbial biocontrol agents and will implement innovative biocontrol strategies to bacterial diseases.